SECTION 02600
MANHOLES

PART 1 - GENERAL

1.1 SUMMARY

A. Manholes shall be precast or monolithic concrete with eccentric cones unless otherwise approved by the Construction Manager (CM).

B. Refer to other sections for items affecting manholes. Coordinate this work with that specified by other sections for timely execution.

C. Shop drawings are required for castings, plastic gaskets, and precast manholes components specified in this section.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the contract, including General and Supplementary Conditions apply to this Section.

1.3 SUBMITTALS

A. Submit shop drawings for all products specified in this section in accordance with the requirements of General and Supplementary Conditions.

PART 2 - PRODUCTS

2.1 CONCRETE MASONRY

A. Reinforced or plain, meeting the applicable requirements of Section 03303, Concrete for Utility Lines

2.2 CLAY BRICK (FOR CASTING ADJUSTMENT)

A. Clay brick shall be medium hard or better quality Grade SM sewer brick conforming to the requirements of ASTM C32. Brick shall be solid and not cored or frogged.

2.3 MORTAR

A. Composed of one part Portland cement and two parts sand (volumetric measure) thoroughly mixed in a tight box, with water added gradually and mixed continually until mortar has attained the proper consistency for use in brick masonry

B. Prepared only in such quantities as needed for immediate use

C. Mortar mixed for more than 30 minutes, retempered, or previously set will not be allowed.

2.4 GRAY IRON CASTINGS

A. Cast iron conforming to the requirements of Class 30, ASTM A48; made accurately to the required dimensions; sound, smooth, clean, and free from blisters and other defects; not plugged or otherwise treated to remedy defects; machined so that covers rest securely in the frames with no rocking and are in contact with frame flanges for the entire perimeter of the contact surfaces; thoroughly cleaned subsequent to machining and, before rusting begins, painted with a bituminous

coating so as to present a smooth finish; tough and tenacious when cold, but not tacky and with no tendency to scale.

B. Actual weight in pounds stenciled or printed by the manufacturer on each casting in white paint.

C. The clear opening in the frame casting shall not be less than 24 inches, and the cover shall weigh not more than 180 pounds. Castings shall be heavy duty type, John Bouchard & Sons Company, No.1150; Neenah Foundry Company, No. R1642, Vulcan Foundry No. VM1312, or equal.

D. Watertight casting shall conform to the above specifications, but shall also be furnished with a neoprene O-ring gasket and countersunk stainless steel bolts to form a watertight seal between the cover sealing surface and the frame.

E. The cover shall include the approved SNS logo as part of the surface design.

2.5 PLASTIC GASKET FOR PRECAST MANHOLES

A. Preformed plastic gasket shall meet or exceed all requirements of FS SS-S-00210, "Sealing Compound, Preformed Plastic for Pipe Joints," Type I, rope form. The sealing compound shall be produced from blends of refined hydrocarbon resins and plasticizing compounds reinforced with inert mineral filler and shall contain no solvents, irritating fumes, or obnoxious odors. The compound shall not depend on oxidizing, evaporating, or chemical action for its adhesive or cohesive strength.

B. It shall be supplied in extruded rope form of suitable cross section and in such sizes as to seal the joint space when the pipes are laid. Use two complete ropes at each joint. The sealing compound shall be protected by a suitable removable two piece wrapper, which shall be designed so that half may be removed longitudinally without disturbing the other half in order to facilitate application of the sealing compound. The flexible plastic gasket shall also meet the requirements of the following table:

Composition	Test Method	Minimum	Maximum
Bitumen (Petroleum Plastic Content)	ASTM D4	50	70
Ash Inert Mineral Matter	AASHO T111	30	50
Volatile Matter	ASTM D6	----	2.0
Property	**Test Method**	**Minimum**	**Maximum**
Specific Gravity at 77 degrees F	ASTM D71	1.20	1.30
Ductility at 77 degrees F (cm)	ASTM D113	5.0	------
Softening Point	ASTM D36	320^{o} F	------
Penetration 77 degrees F (150 gms) 5 sec.	ASTM D217	50	120

2.6 LADDER BARS

A. An aluminum alloy weighing 2.2 pounds or 3/8 inch minimum steel reinforced rod encapsulated in polypropylene plastic.

2.7 PRECAST MANHOLE COMPONENTS

A. Meeting the requirements of the standard drawings and ASTM C478. Manhole barrels shall conform to the requirements of ASTM C76, Class III, with wall thickness B, Type II cement.

B. The manhole sidewall shall be of a length such that a minimum of one course and a maximum of 4 courses of brick shall be placed on top of the unit to bring the casting to grade.

C. The outside of the manhole barrel shall be sealed with a water resistant bituminous seal coat.

2.8 MATERIAL TESTING

A. All precast reinforced concrete manhole risers and tops specified herein shall be tested and inspected by an commercial testing laboratory approved by the CM prior to delivery to the site, and all materials that fail to conform to these specifications shall be rejected.

B. After delivery to the site, any materials that have been damaged in transit or are otherwise unsuitable for use in the work shall be rejected and removed from the site.

C. Supply certified copies in duplicate of the inspection and acceptance reports of the testing laboratory to the CM before using the materials.

D. The commercial testing laboratory shall be engaged and paid for by the Contractor. Submit a certificate from the manufacturer of the castings indicating that they meet all applicable requirements of these specifications.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Dewater sufficiently to maintain the ground water level at or below the bottom of the manhole foundation prior to and during placement of the foundation.

B. Obtain an adequate foundation for all manhole structures by removing and replacing unsuitable material with well graded granular material, by tightening with coarse rock, or by such other means as provided for foundation preparation of the connected sewers or as directed by the CM. Wherever water is encountered at the site, place all cast in place bases or monolithic structures on a one-piece waterproof membrane to prevent any movement of water into the fresh concrete.

C. When the foundation subgrade has been prepared and is approved by the CM, carefully construct the concrete foundation for monolithic manholes to the line and grade required by the drawings. Construct the manholes after the concrete foundation has been allowed to set for a period of not less than 24 hours.

D. For precast manholes, carefully block the base section above the prepared surface so that it is fully and uniformly supported in true alignment; make sure that all entering pipe can be inserted at proper grade. Then place the concrete foundation and invert under and upon this base section as shown in the standard drawings. A base section with monolithic foundation (bottom) may be used when approved by the CM.

E. Thoroughly wet and then completely fill all lift holes and all joints between precast elements with mortar inside and outside. Smooth and paint them outside to ensure watertightness. Coat all joints and touchup all scarred areas on the bituminous seal coat.

F. Construct monolithic concrete manholes and bases of 4,000 psi concrete in accordance with the provisions of this section and applicable provisions of Section 03303, Concrete for Utility Lines.

The ladder bars shall be cast in place. The inside and outside of the manhole barrel shall be sealed with a water resistant bituminous seal coat.

G. Carefully set the cast iron frame for the cover at the required elevation, and properly bond it to the masonry with cement grout and/or anchor bolts. Wherever manholes are constructed in paved areas, tilt the top surface of the frame and cover so as to conform to the exact slope, crown, and grade of the existing adjacent pavement.

H. Manhole inverts shall be constructed of concrete or Portland cement mortared masonry fill and may, at the Contractor's option, be covered with cement mortar to the approximate cross section of the sewers connected to them. Make any necessary changes in cross sections gradually from side to side of the manhole; make changes in direction of flow of the sewers to a true curve of as large a radius as is permitted by the size of the manhole. Construct brick inverts with the brick laid on edge and longitudinally with the invert channel. Inside face joints shall be not more than 1/4 inch thick.

I. All rigid unreinforced pipe entering or leaving the manhole shall be provided with flexible joints within 12 inches of the manhole structure, or encase the full joint in concrete. Place such pipe on firmly compacted bedding, particularly in the area of the manhole excavation, which is normally deeper than excavation for sewer trenches. Take special care to see that the openings through which pipes enter the structures are completely and firmly rammed full of shrinkproof mortar or otherwise constructed to ensure watertightness.

J. Use gasketed PVC manhole sleeves on all PVC pipe at connections to manholes.

K. Where the difference in the invert elevation of two or more sewers intersecting in one manhole is 24 inches or more, construct a drop manhole. Drop manholes shall be similar in construction to standard manholes except that a drop connection of pipe and fittings of the proper sizes and materials shall be constructed outside the manhole, adequately supported and backfilled with TDOT No. 67 crushed stone, as indicated by the standard drawings.

L. Place backfill by hand around the manhole and to a distance of at least one pipe length into each trench, and tamp with selected material up to an elevation of 12 inches above the crown of all entering pipes. Continue backfilling in accordance with the requirements for trench backfilling.

3.2 VACUUM TESTING OF MANHOLES

A. All manholes are to be vacuum tested upon completion as soon thereafter as possible.

B. The manhole-to-pipe connection shall be a flexible connector, such as the Kor-N-Seal or approved equal. A 60-inch/lb torque wrench shall be used to tighten the external clamps of the Kor-N-Seal connector.

C. All lift holes shall be plugged with a non-shrinking mortar, as approved by the Construction Manager.

D. The seal between the manhole sections shall be in accordance with ASTM C923.

E. The Subcontractor shall plug the pipe openings, taking care to securely brace the plugs and the pipe.

F. With the vacuum tester set in place:
   1. Inflate the compression bank to effect a seal between the vacuum base and the structure.
   2. Connect the vacuum pump to the outlet port with the valve open.
   3. Draw a vacuum to 10 inches of Hg. and close the valve.

G. The test shall pass if the vacuum remains at 10 inches Hg. or drops no more than one inch in a time of one minute. If the manhole fails the initial test, the Subcontractor shall repair the leaks by digging down around the outside of the manhole and sealing the leaks on the outside as well as on the inside.

END OF SECTION 02600